It's Changing Our World

by

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Alerton Technologies, Inc.

Alerton Background

- *Formed 1981*
- *Early DDC Mfg.*
- *Worldwide Dist.*
- *First Windows OS*
- *First to Develop "Native" BACnet System*

Redmond, WA

Alerton Background

1995

Awarded

450 Golden Gate

BACnet Project

San Francisco, CA

Alerton Background

Founding Member of BMA

BMA™ BACnet MANUFACTURERS ASSOCIATION

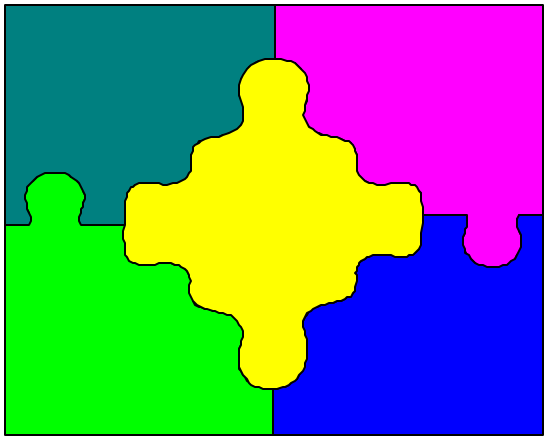
BACnet TESTING LABORATORIES BTL™

Why BACnet?

What are the market forces?

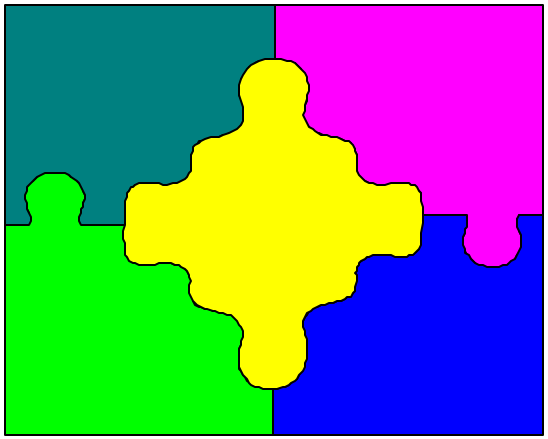
What are the expected benefits?

The Controls Industry – 1980s



- *Single-vendor proprietary systems*
- *Difficulty using multi-vendors*
- *Little or expensive integration*

The Controls Industry – 1980s



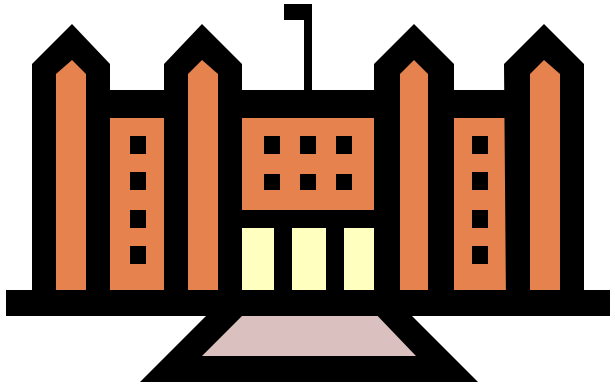
- *No industry protocol "standard"*
- *Large vendor dominance*

Proprietary Systems...

Leave Building Owners Subject to the Vendor

Proprietary System - Downsides

- *Locked into one vendor*
- *No competitive bidding*
- *Limited product choices*
- *Lack of service*
- *Expensive future extensions*
- *Little or no integration*



The Demand for a "Standard"

Frustrated building owners demanded an alternative way for systems to "talk" or interoperate with each other.

What is BACnet?

A data communication protocol for building automation and control networks.

BACnet Protocol Components

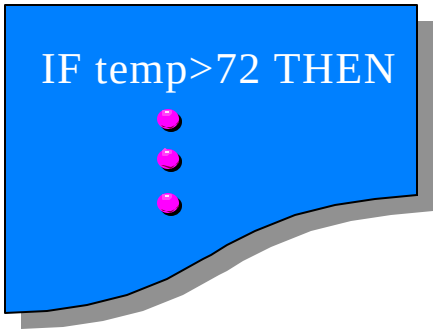
- Devices
- Objects
- Properties
- Services
- Networks

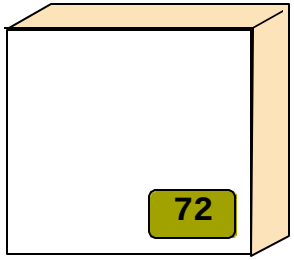
BACnet Device

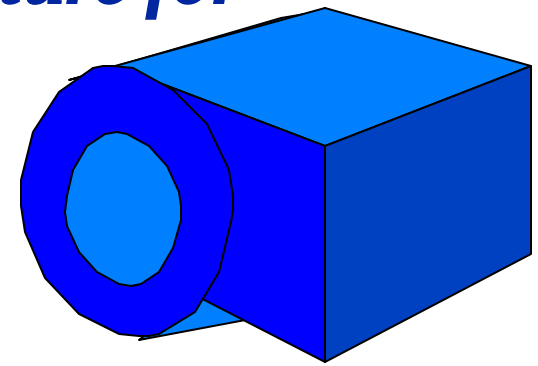
- *Any unit connected to a BACnet network*
  - *Workstation*
  - *Global – network controller*
  - *Unitary or field controller*
  - *Sensor*
  - *Gateway*

BACnet Objects

- *Objects represent physical inputs, outputs and software processes*
- *Objects describe a data structure for communications*

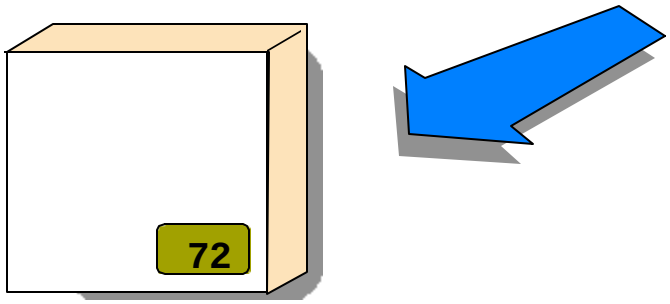






BACnet Objects

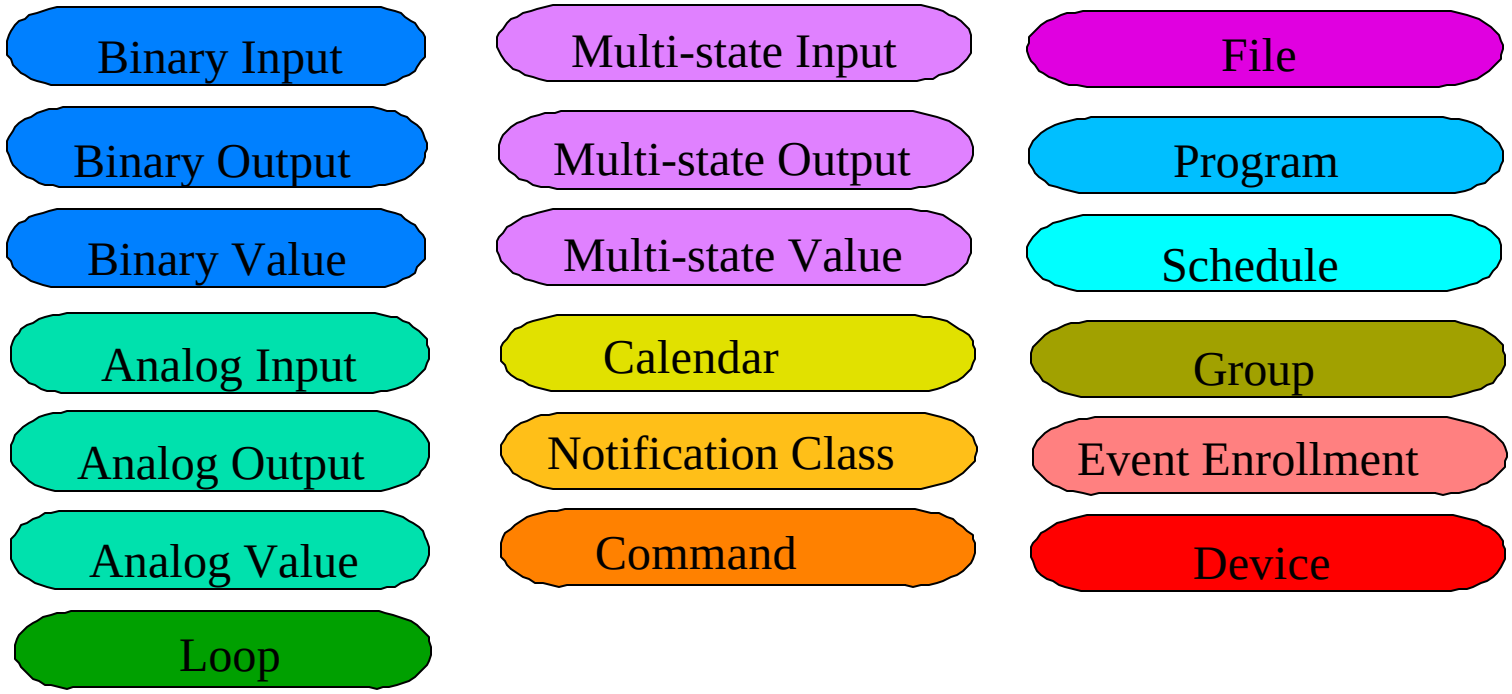
Objects consist of a set of properties (attributes) which belong to each object



Object_Name	SPACE TEMP
Object_Type	ANALOG INPUT
Present_Value	72.3
Status_Flags	Normal,InService
High_Limit	78.0
Low_Limit	68.0

BACnet Objects

BACnet defines a collection of standard objects



BACnet Services

- *Services are commands within the protocol*
- *BACnet devices provide broad categories of services*
  - *Object access*
  - *Device management*
  - *Alarm and event*
  - *File transfer*

BACnet Networks

- BACnet specifies 5 network types for different applications:
  - Ethernet over coax, 10 BaseT, or fiber
  - ARCNET over coax, UTP, or fiber
  - MS/TP over EIA-485, shielded twisted pair
  - PTP-point to point single connection
  - LONTalk DataLink only (all media)

Benefits of BACnet

- *True industry "standard"*
- *Non- proprietary*
- *Allows integration*
- *Competitive bidding*
- *Technically advanced*

Benefits of BACnet

- *Cost effective extensions*
- *Single seat system operation*
- *Web based and enterprise large scale solutions*

How did BACnet Come About?

Driven by end-users and backed by ASHRAE, a cross-section of the industry spent nearly nine years gaining a consensus.

BACnet Becomes a Standard

1995, BACnet is endorsed as an ASHRAE/ANSI standard.

What is a Standard?

To become a true industry standard, a recognized standards body must make a formal endorsement, i.e., ASHRAE, NIST, ANSI, ISO, etc.

What is a de facto *Standard?*

A de facto standard is something that is not endorsed by a standards body, but is used almost without exception.

What is an "Open" System?

An open system is one where a manufacturer simply makes their proprietary protocol available to others.

"Open" vs. "Standard" Protocol

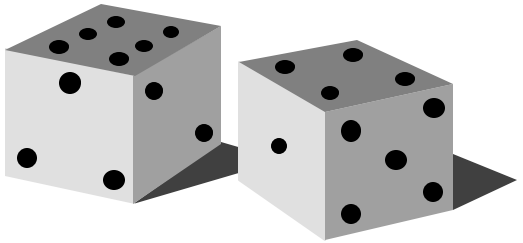
- ***An open protocol is simply a protocol that has been published***
- ***An open protocol is not necessarily a "standard"***
- ***An open protocol may become a de facto standard, if…***

Strengths of a Protocol "Standard"

- ***Industry support***
- ***Integration & interoperability***
- ***Longevity***
- ***Stability***
- ***Completeness***
- ***Non-proprietary***

Risks of a Non-Standard Protocol

- *"Pay to Play" schemes skew market*
- *Changed on a whim*
- *Can be tied to proprietary hardware*
- *Politically influenced?*
- *Lack of agency endorsement*



The Wide World of Protocols

- All proprietary protocols
- CAB
- CEBUS
- Data Highway Plus
- EIB
- FND
- LonTalk
- Modbus
- N2
- Profibus
- X-10
- and more...

Criteria - Evaluating Protocols

- ***Scalability & horsepower***
- ***Commercial & political issues***
- ***Open vs. standard vs. de facto***
- ***Intended applications***
- ***Technology***

How BACnet Measures Up

- *Scalable*
- *Supports all system levels*
- *Sufficient horsepower*
- *Designed specifically for buildings*
- *ASHRAE standard*
- *Non-proprietary*

BACnet as a Standard

- ASHRAE/ANSI standard
- European pre-standard CEN
- ISO draft standard
- Korean standard
- Proposed NEMA standard

ORGANISATION INTERNATIONALE DE NORMALISATION

ISO

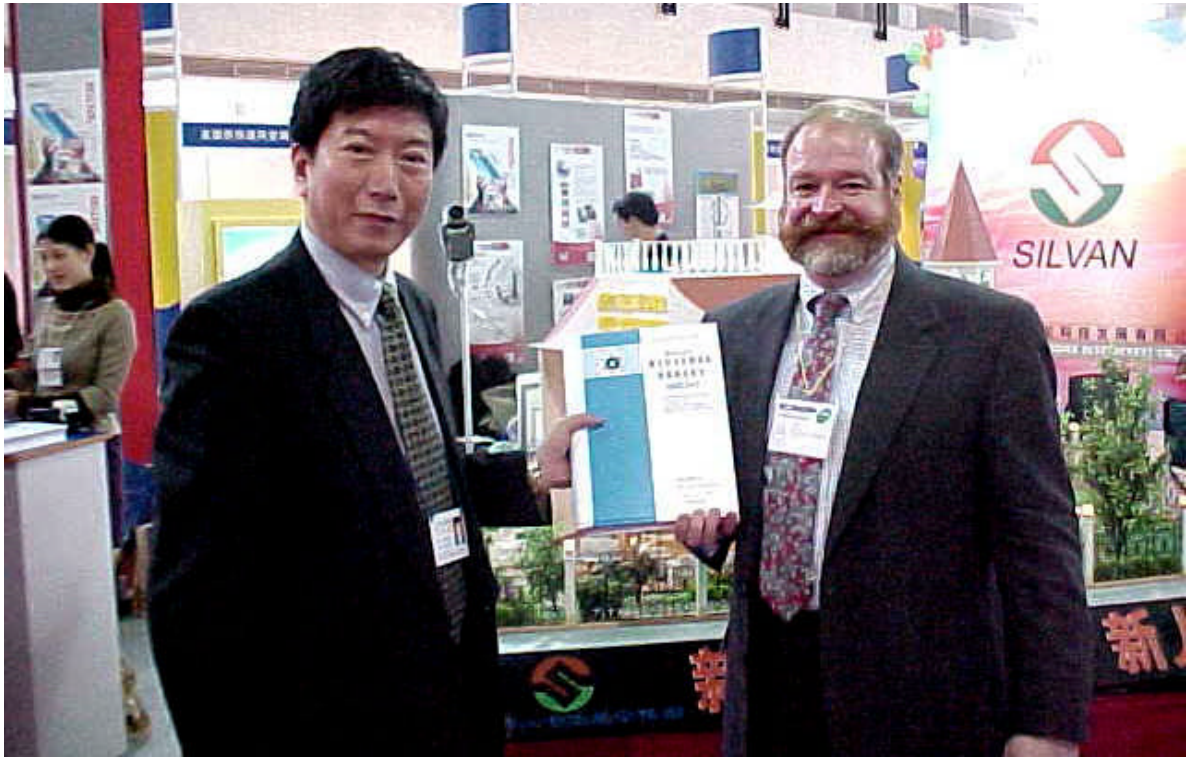
INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

cen

ANSI American National Standards Institute

BACnet Goes To China

Specification translated into Chinese, 2001



BACnet as an ASHRAE Standard

- ***ASHRAE mandates fair market representation on committee***
- ***ASHRAE has no commercial or political interest***
- ***ASHRAE has been creating industry standards for 100 years***

BACnet Organizations

BMA™ BACnet MANUFACTURERS ASSOCIATION

BTL™ BACnet TESTING LABORATORIES

BACnet BIG-NA

BACnet® Interest Group Europe e.V.

BIG-AA

The BMA

BMA™ BACnet MANUFACTURERS ASSOCIATION

BTL BACnet TESTING LABORATORIES

- *Comprised of most controls companies*
- *Promotes market awareness of BACnet*
- *Oversees BACnet Testing Labs (BTL) for products*

The BTL

- *Tests products for BACnet interoperability*
- *Lists successfully tested products with BTL logo*
- *Provides testing tools to the industry*
- *Listed products in 2001*

BACnet Evolves

- *BACnet - IP*
- *Addendum 135c, fire applications*
- *NEMA & IESNA, lighting applications*
- *Object profiles to Konnex (Batibus, EIB, EHS, EIEIJ/P protocols)*

Why Alerton Chose BACnet

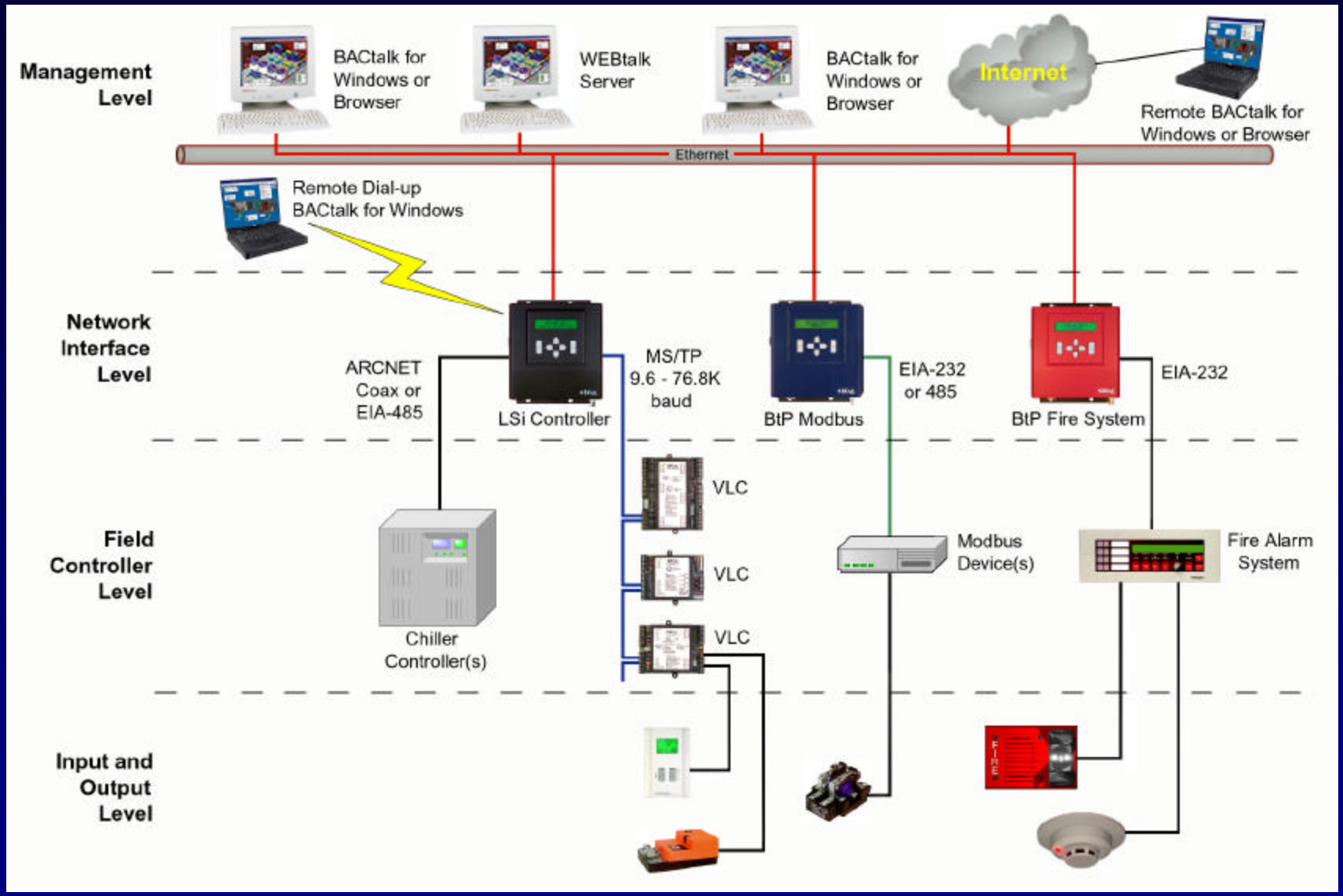
- *BACnet is a true standard*
- *The industry will migrate to standards*
- *Demand for interoperability & integration*
- *Customer will benefit*
- *Superior technology*

Why Alerton Chose BACnet

- *Can be implemented at every system level*
  - *Workstation*
  - *Network/global controller*
  - *Lowest level controllers*
- *Implementation is price competitive*
- *System integration simplified*

The 1st Total Native BACnet System

A System Architecture



MIDWAY AIRPORT

Chicago, Illinois

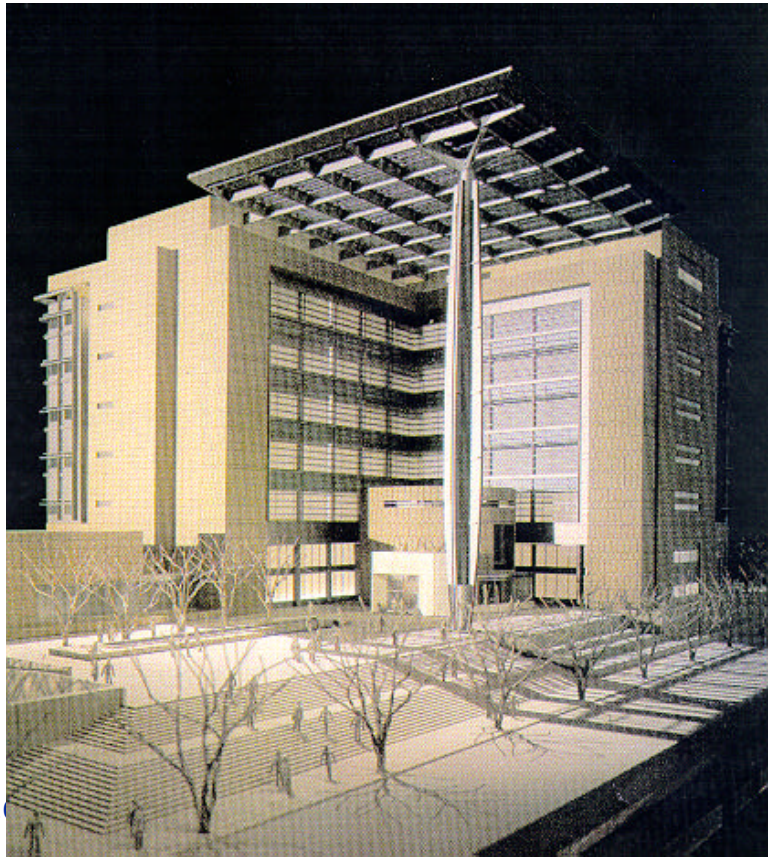
- *Complete native BACnet control system*
- *647 native BACnet VAV controllers*
- *Native BACnet workstation*

BACnet Projects

U.S. Federal Bldg., Court House

Las Vegas, NV

- New 410,000 sq. ft. facility
- All native BACnet
- 430 BACnet VAV controllers
- 3 Trane Chillers-BACnet interface
- BACnet/Modbus VFD interface
- Lighting control



BACnet Projects

450 Golden Gate
San Francisco, CA

- First large scale BACnet project
- BACnet pilot project
- Sponsored by many agencies

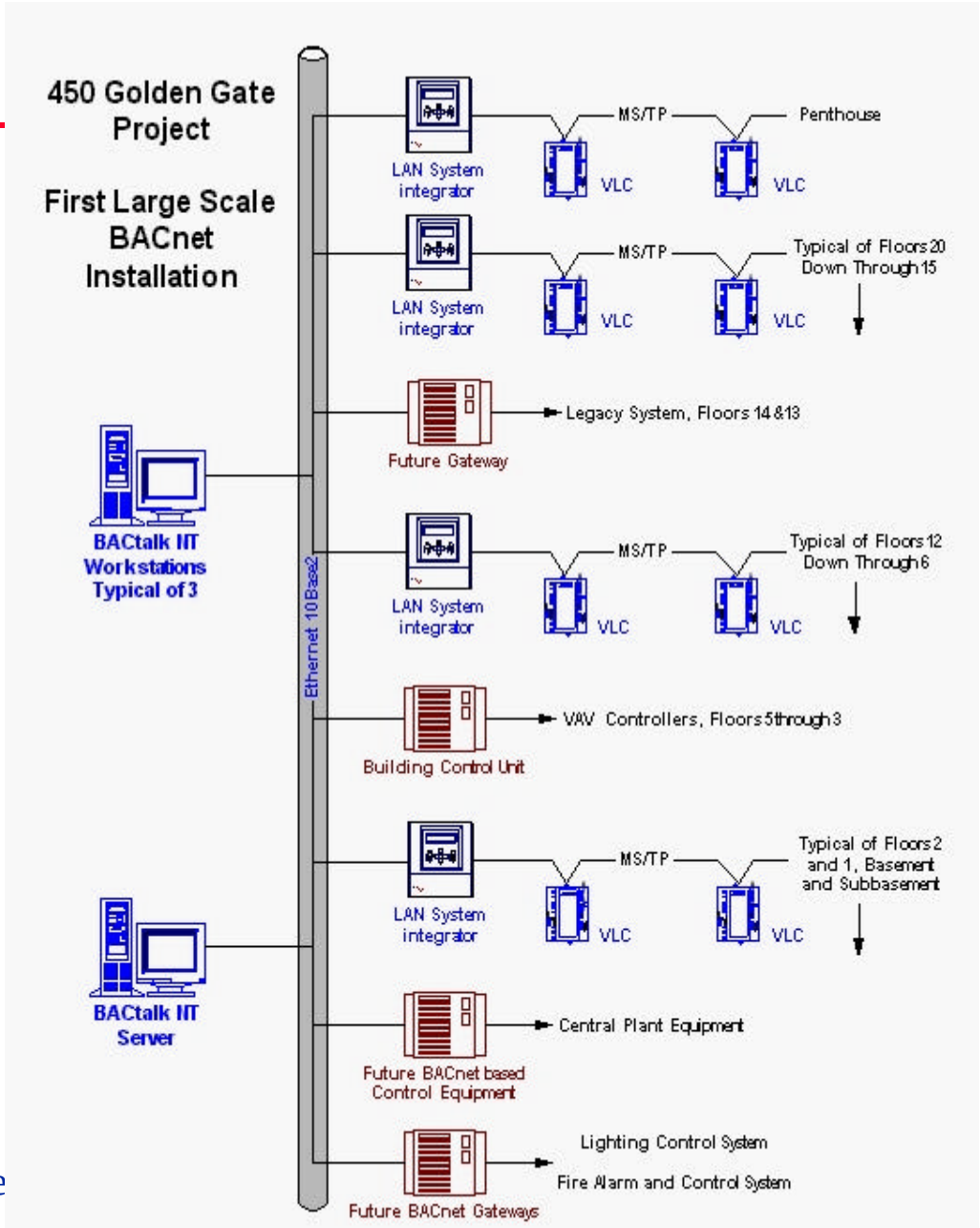
Scope of Work

- *Install Windows NT Server and 4 workstations*
- *Install Ethernet backbone*
- *Retrofit 812 dual-duct and 60 single duct VAV boxes with native BACnet controllers*
- *Retrofit 8 main AHU's with native BACnet controllers*
- *Integrate with Trane BACnet controllers on 3 floors*

CONTROL

450 Golden Gate Project

Architecture



June 3-6, 2001

www. ene

BACnet Projects

U.S. Marine Corps Base
Camp Lejeune, NC

- Multi-building retrofit
- Native BACnet
- 340 VAV controllers
- Central plant control

FIELD MUSEUM
Chicago, Illinois

- Native BACnet controls retrofit
- 20 Base 2 Ethernet network
- Chiller controls
- 1,000 point system

BACnet Projects

Bank of America Tower Seattle, WA

- ***76 Story controls retrofit***
- ***All native BACnet***
- ***2,200 heat pumps***
- ***10 Base 2 Ethernet network***
- ***Over 12,000 points***

BACnet Projects

GEORGE BUSH AIRPORT
Houston, Texas

- Complete HVAC system upgrade
- Retrofit with native BACnet controls
- BACnet VAV box controls and AHU controls

BACnet Projects

McMurdo Station
McMurdo, Antartica

- Multi-building controls system
- Fiber optic LAN
- Native BACnet controls

BACnet Projects

U.S. DEPARTMENT OF COMMERCE

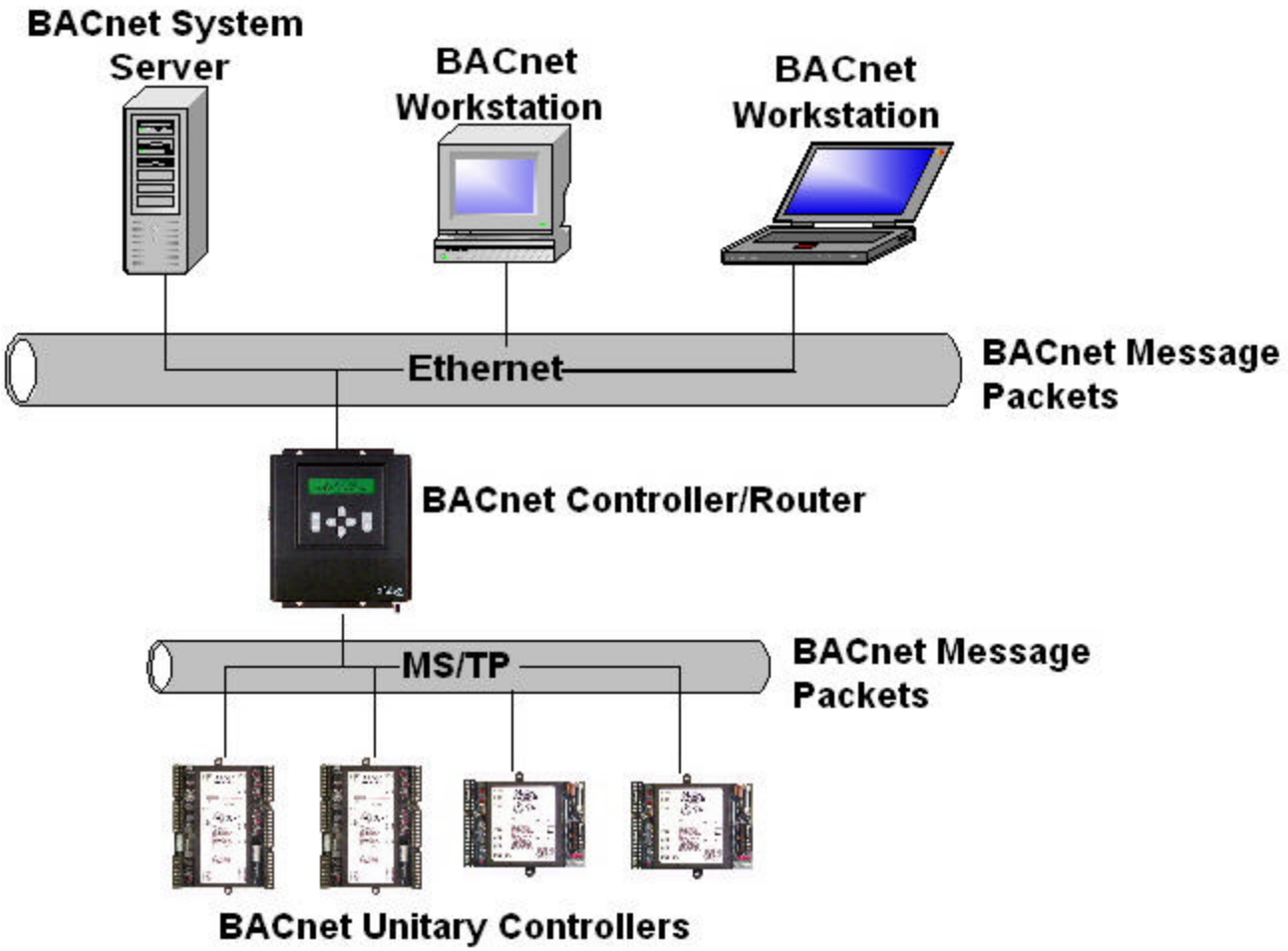
- Washington, D.C.

- Native BACnet retrofit
- 66 Dual-duct AHU controllers
- BACnet interface to Dunham Bush chillers
- 1.5 Million sq. ft.

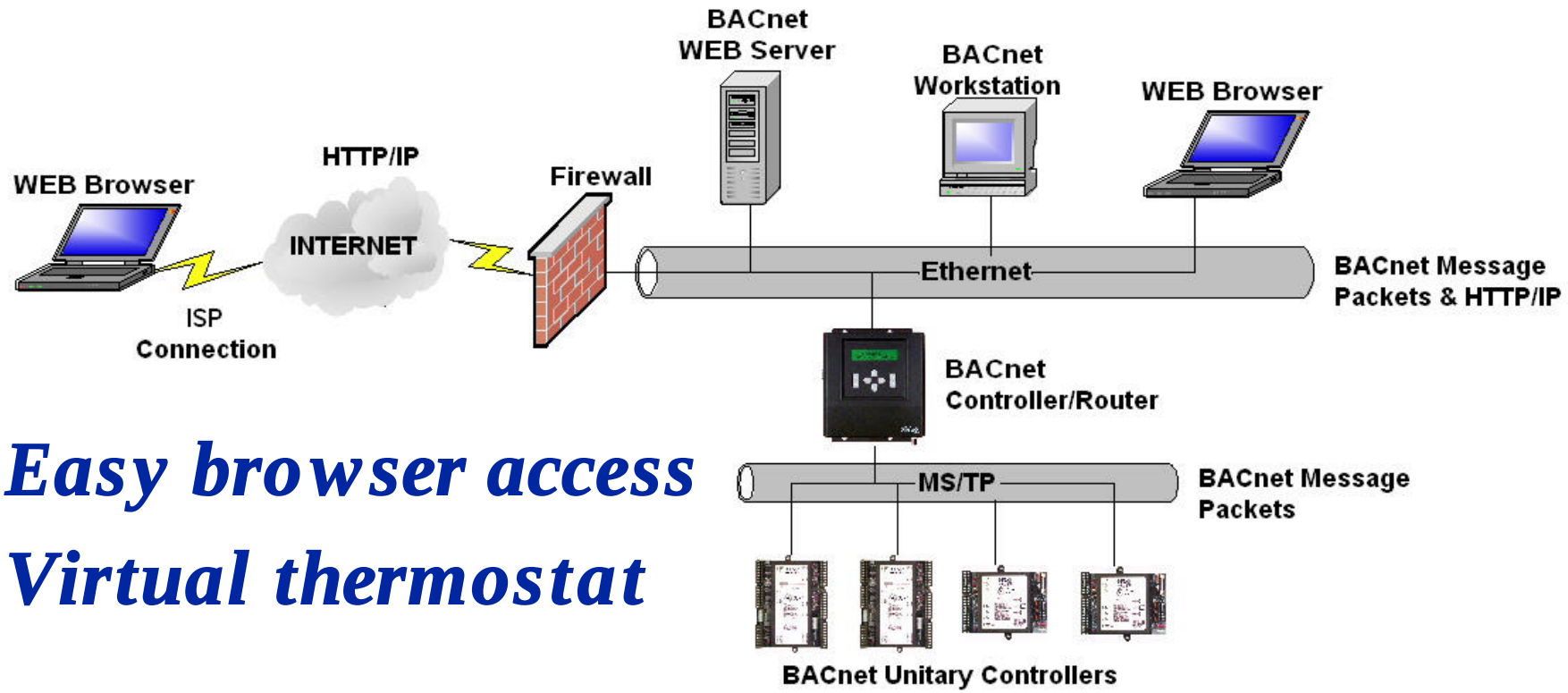
BACnet and the Internet

- ***Two Separate Technologies***
  - ***BACnet WEB servers***
    - ***Data viewing technology***
  - ***BACnet over IP networks***
    - ***Data sharing technology***

Simple BACnet System



BACnet WEB Server



- *Easy browser access*
- *Virtual thermostat*

BACnet WEB Server Cautions

- ***Designed for user interface, not data sharing***
- ***Some manufacturers charge per user***

BACnet WEB Server Advantages

- *Best choice for high user traffic*
- *Utilizes existing browser*
- *Not tied to control manufacturer*
- *Common platform for user interfaces*

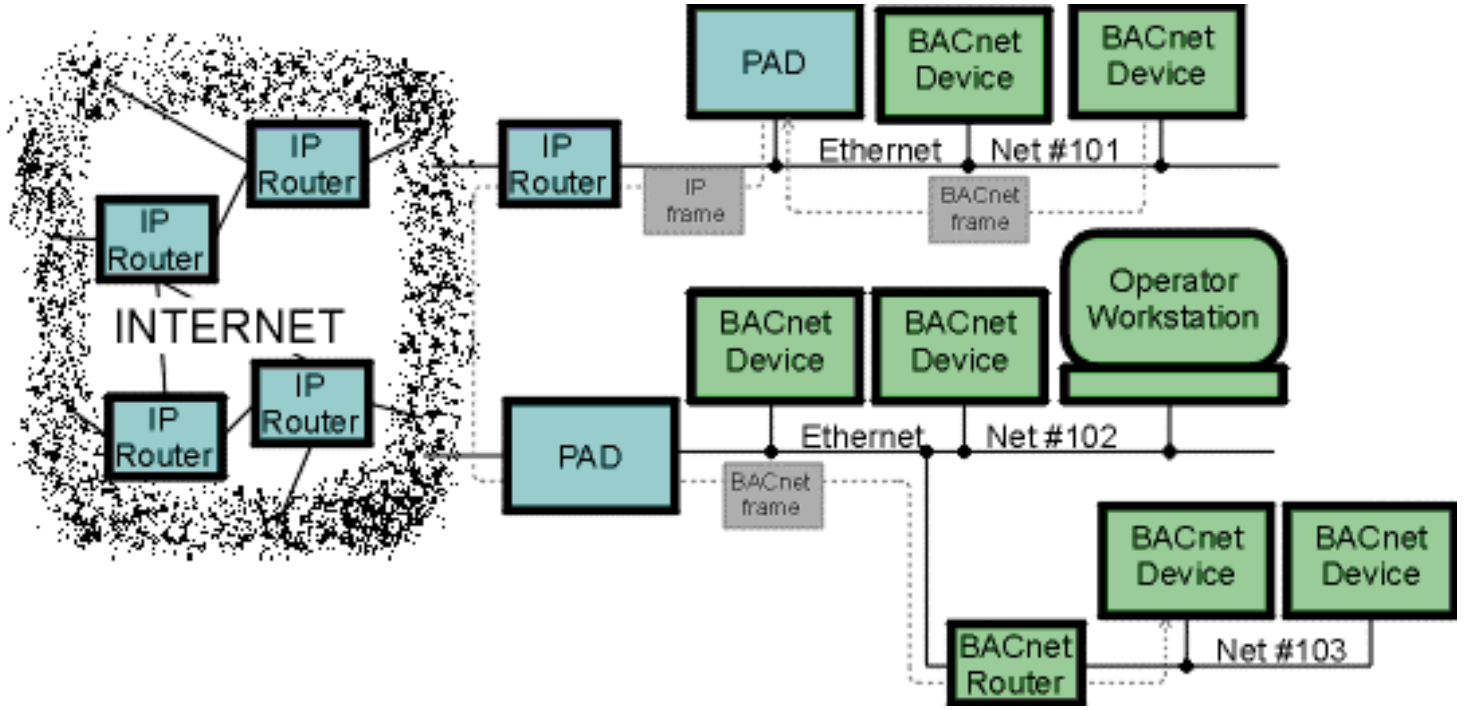
BACnet Over IP - What Is It?

- *Allows BACnet messages to be transmitted over IP networks*
- *Utilizes UDP/IP*
- *Compatible with IP/WANs*
- *Specified in Annex H.3 and J of BACnet specification*

BACnet Annex H.3

- ***Annex H.3 specifies:***
  - ***Packet Assembler Disassembler Devices (PAD)***
  - ***Encapsulates BACnet messages in IP packets (IP tunneling)***
  - ***Uses fixed IP addresses***

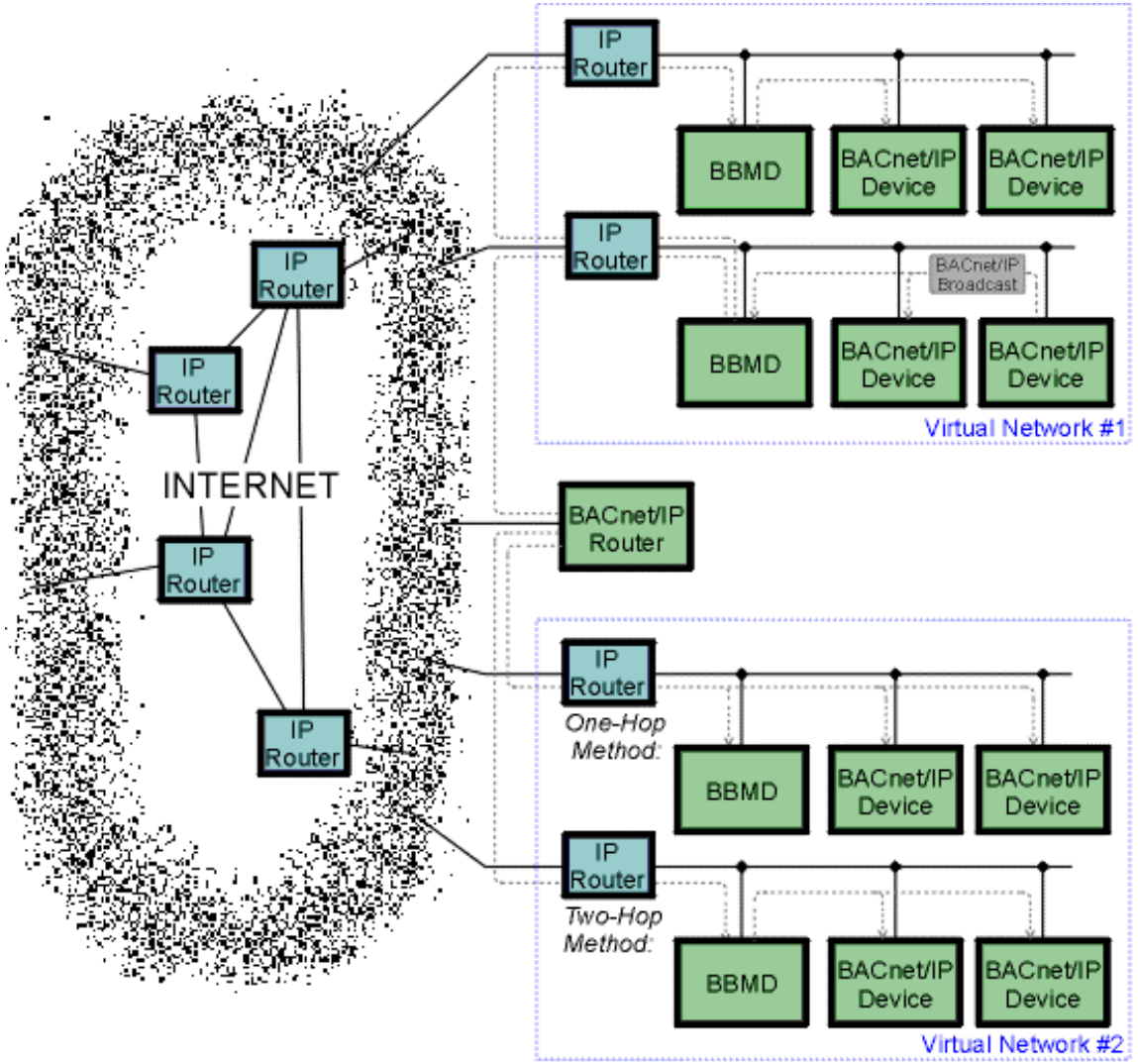
BACnet Annex H.3



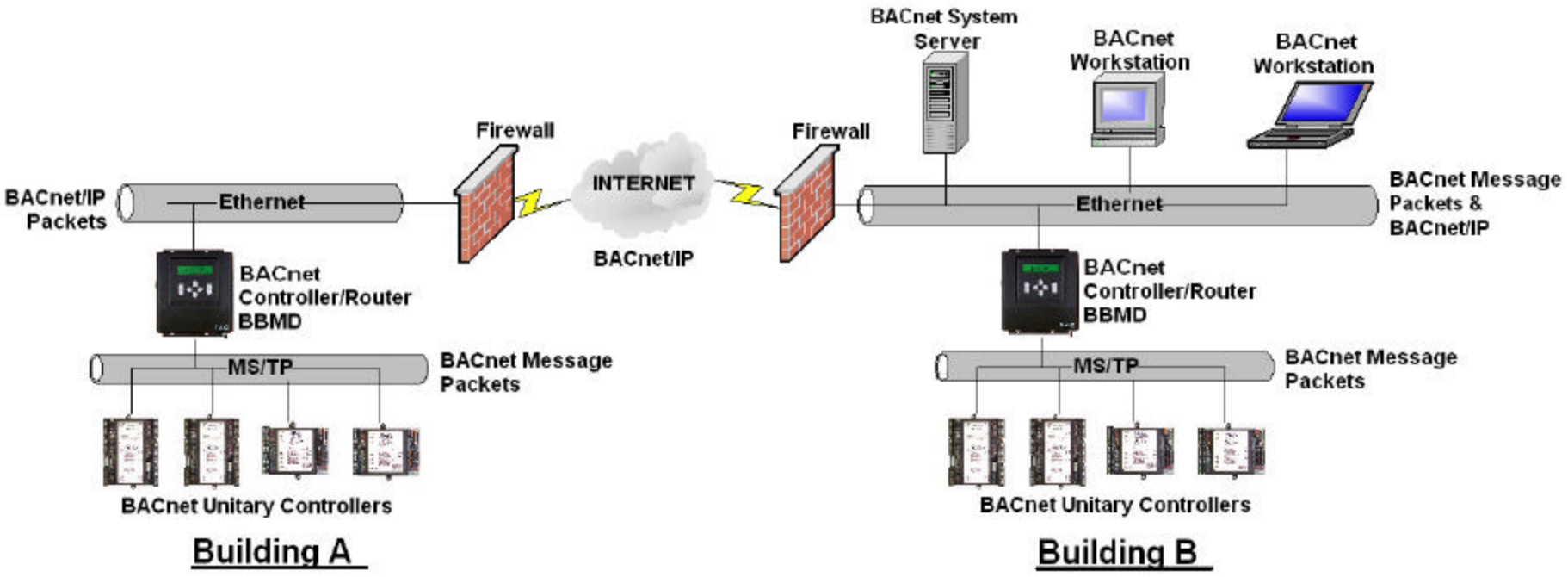
BACnet Annex J

- ***Annex J specifies:***
  - ***Native BACnet/IP***
  - ***BACnet/IP Broadcast Management Devices (BBMD)***
  - ***Allows flexible connections from roving workstations***

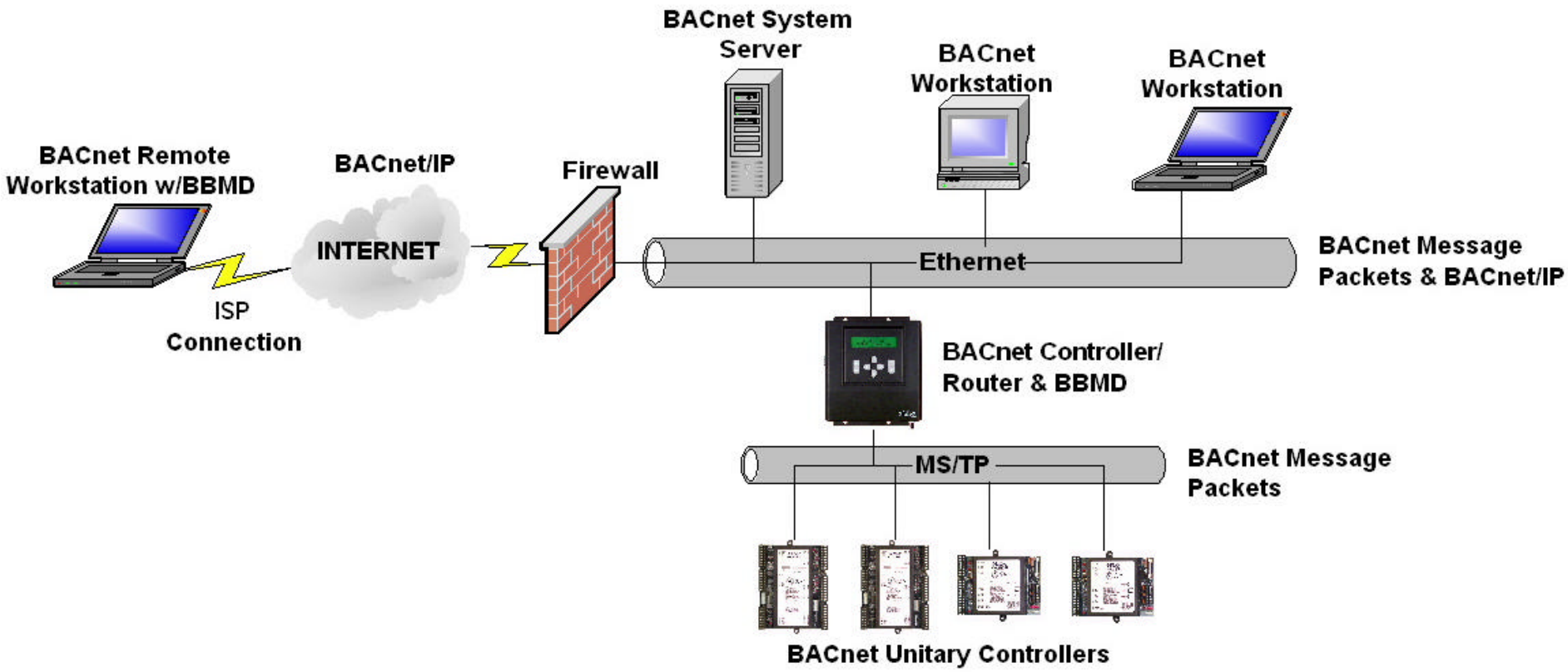
BACnet Annex J



Split BACnet System Over IP

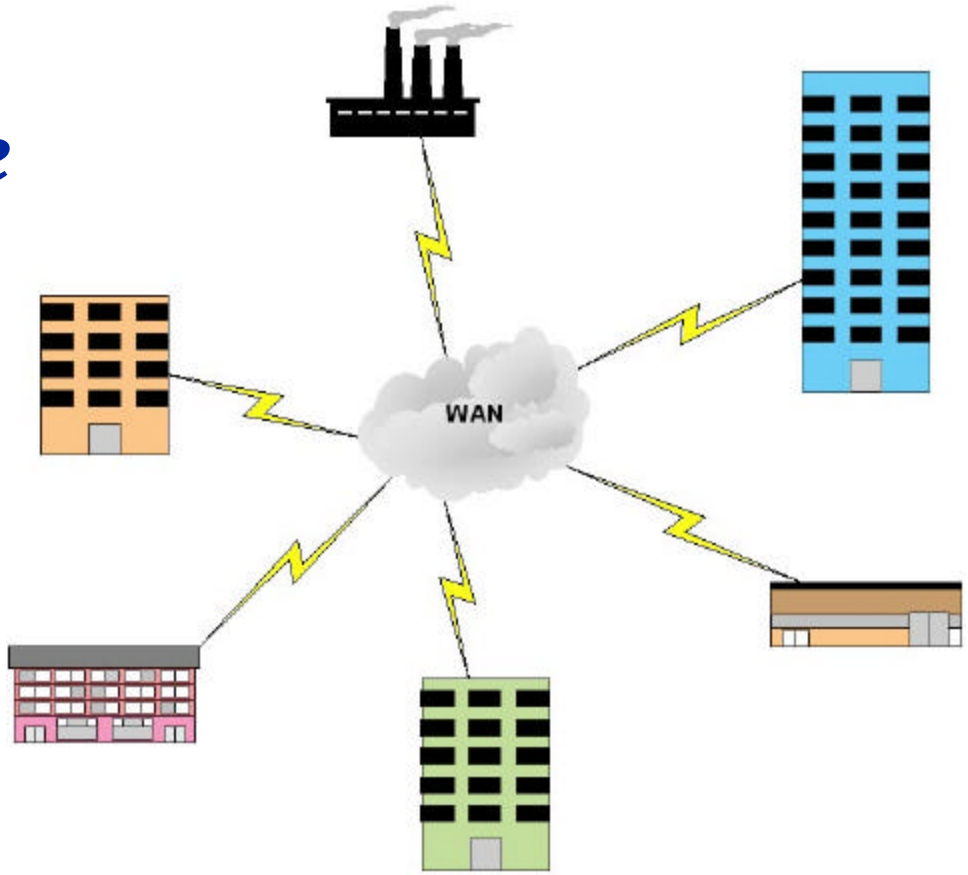


Remote Workstation Over IP

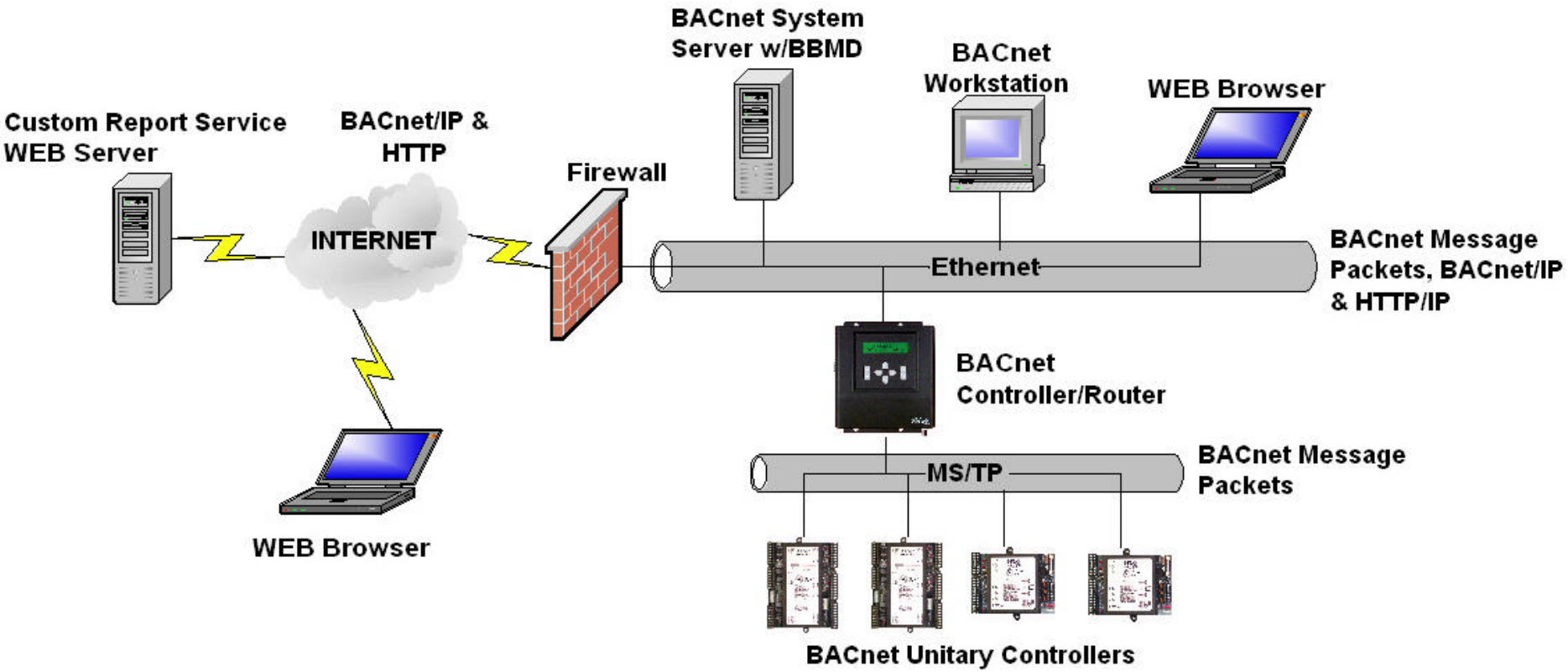


BACnet/IP WAN Capabilities

- *Internet as backbone*
- *No leased lines*
- *Fast data sharing*
- *Easy remote access*

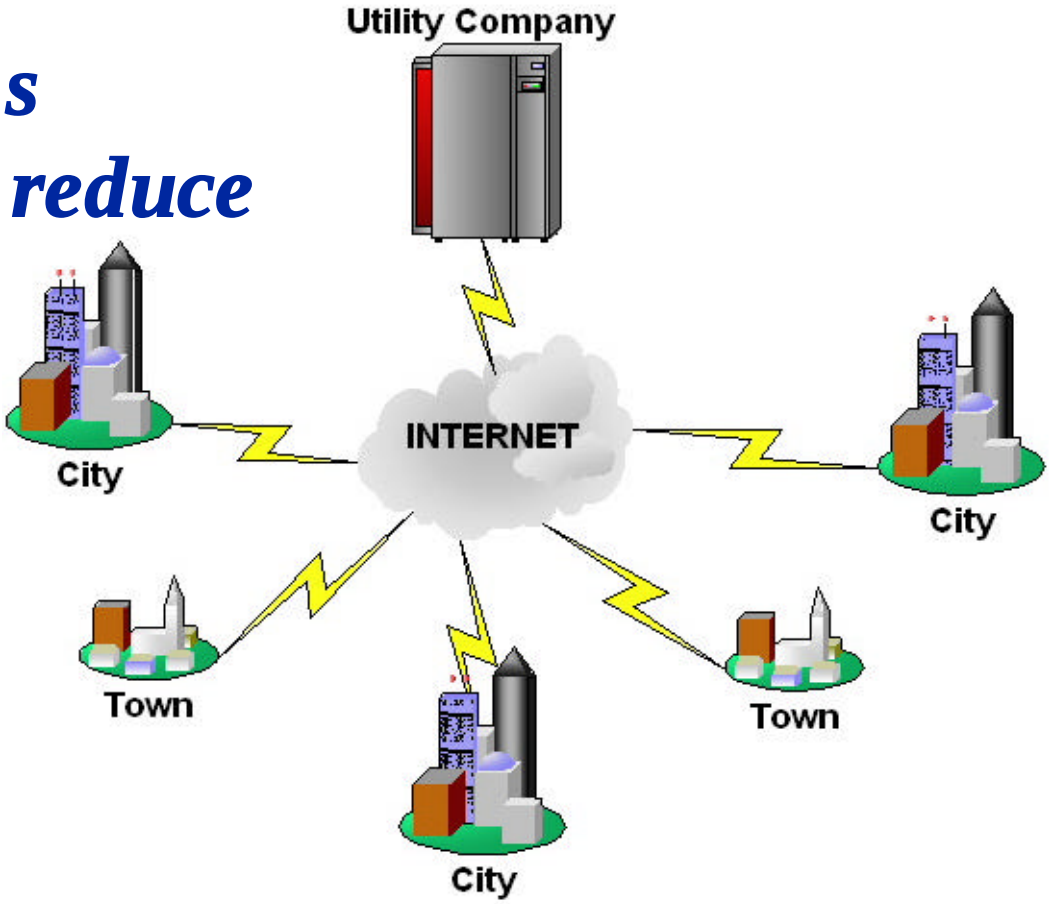


3rd Party Customized Reports



Utility Initiated Demand Limiting

- *BACnet port allows utilities to quickly reduce demand*
- *Smart load shed*
- *Better than rolling blackouts*



BACnet Protocol

- *Allows for 3rd party management software development*
- *Winning out over other so called standards*
- *Protects you against protocol wars*

BACnet Protocol

- *The only true standard protocol for BAS*
- *Quickly recognized as the management and supervisory level standard*
- *Best choice for enterprise solutions*

BACnet & BACnet/IP

- ***Best BAS Protocol for the Here and Now***
- ***Superior BAS Protocol for the Future***

It's Changing Our World!

BACnet®